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EXAMINER

LEWIS, PATRICK T

ART UNIT

PAPER NUMBER

1623

DATE MAILED: 06/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.



## **DETAILED ACTION**

### ***Request for Continued Examination***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 28, 2006 has been entered.

### ***Applicant's Response Dated April 28, 2006 (RCE filed May 24, 2006)***

2. Claims 1-2, 4, 7-8, and 10-13 are pending. An action on the merits of claims 1-2, 4, 7-8, and 10-13 is contained herein below.

3. The rejections of claims 1-2, 4, 7 and 10-12 under 35 U.S.C. 103(a) as being unpatentable over Weibel US 4,831,127 (Weibel); Vovlas et al. Revue. Nematol. (1985), Vol. 8 (2), pages 125-130 (Vovlas); and Arena et al. US 4,752,579 (Arena) in combination is maintained for the reasons of record set forth in the Office Action dated February 16, 2006.

4. The rejection of claim 8 under 35 U.S.C. 103(a) as being unpatentable over Weibel US 4,831,127 (Weibel); Vovlas et al. Revue. Nematol. (1985), Vol. 8 (2), pages 125-130 (Vovlas); and Arena et al. US 4,752,579 (Arena) in combination as applied to claims 1-2, 4, 7 and 10-11 above, and further in view of Gatzi et al. Hel. Chim. Acta.

(1938), Vol. 21, pages 195-205 (Gatzi) is maintained for the reasons of record set forth in the Office Action dated February 16, 2006.

***Rejections of Record Set Forth in the Office Action Dated February 16, 2006***

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 1-2, 4, 7 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weibel US 4,831,127 (Weibel); Vovlas et al. *Revue. Nematol.* (1985), Vol. 8 (2), pages 125-130 (Vovlas); and Arena et al. US 4,752,579 (Arena) in combination.

7. Applicant's arguments filed December 12, 2005 have been fully considered but they are not persuasive. Applicant argues that: 1) the prior art does not teach the selective production of L-arabinose and 2) just because Weibel suggests that 'other parenchymal cell-containing plants may be used' does not mean Weibel contemplates the instantly claimed method.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

As explicitly set forth by Weibel, reaction times which are sufficient to liberate hemicellulosic components from sugar beet pulp, pectin and arabinogalactans will vary

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depending on pH employed and the reaction temperature. As will also be understood by those skilled in the art, wide combination of pH's, reaction time and temperature will be satisfactory for performing the disclosed methods. Such persons will appreciate that variations of such parameters may be employed to modify the total output of hemicellulosic materials to be produced in accordance with the described methods. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention that acidic hydrolysis of parenchymal cell-containing plants would yield arabinose, with the yield being dependent upon the reaction conditions (i.e. temperature, pH, time, etc.).

One of ordinary skill in the art at the time of the instant invention would have been motivated to use envelopes of corn grain as the arabinose source based on the teachings of Arena. Arena teaches a source of cellulose in corn kernel hulls, a waste product of corn milling operations, which contains little or no lignin (column 1, lines 40-65). Consequently, corn kernel hulls can be hydrolyzed in high yield without any delignifying pretreatment to afford a mixture which is mainly D-glucose, D-xylose, and L-arabinose. Recognizing the advantages accruing from an abundant source of cellulose which requires no delignification pretreatment to make cellulose available to hydrolytic agents, Arena has developed several variants on a theme of hydrolyzing corn kernel hulls to a mixture of monosaccharides. A typical analysis of corn kernel hulls shows about 20% starch, about 30% cellulose, about 30% hemicellulose, about 10% protein, and less than 5% lignin (column 2, lines 32-65). Consequently, corn kernel hulls act differently from typical lignocellulosics in not requiring delignification in order to

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hydrolyze the cellulose and hemicellulose components. In acid hydrolysis of corn kernel hulls, the yield of glucose is quite temperature dependent, whereas the yield of the pentoses, D-xylose and arabinose, is relatively invariant. This permits a degree of control of hydrolysate content. One embodiment of Arena comprises hydrolyzing corn kernel hulls with a strong acid at a temperature range of about 80 to 110 C, subsequent enzymatic hydrolysis of the hydrolysate, and recovering the resulting enzymatic hydrolysate (column 3, lines 13-28). Among the strong acids which may be used are sulfuric acid, hydrochloric acid, and phosphoric acid. Arena further teaches the preferential production of arabinose (column 5, lines 50-58).

The prior art (Wiebel) teaches a process for producing L-arabinose from a parenchymal cell-containing plant material employing acidic hydrolysis wherein the concentration of the acid (HCl) was 0.01 N to 0.15 N and the hydrolysis temperature is greater than about 125 C. Arena teaches that corn kernel hulls, a parenchymal cell-containing plant material, can be hydrolyzed in high yield without any delignifying pretreatment to afford a mixture which is mainly D-glucose, D-xylose, and L-arabinose. Avoidance of the delignifying pretreatment step would provide sufficient motivation for employing corn kernel hulls as the arabinose source material. The prior art clearly shows that yield is dependent on a combination of factors such as temperature and pH and would have been readily recognized by one of ordinary skill in the art at the time of the invention.

In regards to the enzymatic degradation step of Weibel, applicant's arguments are not germane. Applicant should not that the use of "open-ended" claim language allows for the employment of additional methodological steps.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weibel US 4,831,127 (Weibel); Vovlas et al. Revue. Nematol. (1985), Vol. 8 (2), pages 125-130 (Vovlas); and Arena et al. US 4,752,579 (Arena) in combination as applied to claims 1-2, 4, 7 and 10-11 above, and further in view of Gatzi et al. Hel. Chim. Acta. (1938), Vol. 21, pages 195-205 (Gatzi).

Applicant argues that since Weibel, Vovlas and Arena do not render obvious the instantly claimed process for manufacture of L-arabinose, the instant claim is also unobvious. However, said method for the manufacture of L-arabinose is still deemed obvious in view of the cited prior art. Thus, applicant's argument is not persuasive.

#### ***Claim Rejections - 35 USC § 103***

9. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

10. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weibel US 4,831,127 (Weibel); Vovlas et al. Revue. Nematol. (1985), Vol. 8 (2), pages 125-130 (Vovlas); and Arena et al. US 4,752,579 (Arena) in combination as applied to claims 1-2, 4, 7 and 10-12 above, and further in view of Gatzi et al. Hel. Chim. Acta. (1938), Vol. 21, pages 195-205 (Gatzi).

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Claim 13 is drawn to a process for the manufacture of L-arabitol comprising hydrogenating a solution containing L-arabinose.

Gatzi teaches the catalytic hydrogenation of L-arabinose using Raney Ni and H<sub>2</sub> to produce L-arabitol (English Abstract).

It would have been obvious to produce L-arabitol by hydrogenating a solution containing L-arabinose since such method is expressly taught in the prior art. The method by which the L-arabinose was produced does not render the instant method for producing L-arabitol unobvious.

### ***Conclusion***

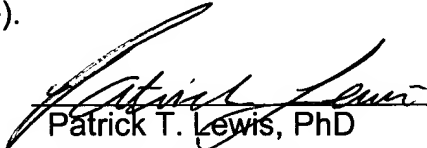
11. Claims 1-2, 4, 7-8, and 10-13 are pending. Claims 1-2, 4, 7-8, and 10-13 are rejected. No claims are allowed.

**Contacts**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick T. Lewis whose telephone number is 571-272-0655. The examiner can normally be reached on Monday - Friday 10 am to 3 pm (Maxi Flex).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James O. Wilson can be reached on 571-272-0661. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Patrick T. Lewis, PhD  
Primary Examiner  
Art Unit 1623

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